

TWO DIFFERENT TYPES OF DEBRIS AVALANCHE DEPOSITS AT LAS DERRUMBADAS RHYOLITE DOMES, EAST-CENTRAL MEXICO

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The closed basin of Serdan-Oriental and its Quaternary Las Derrumbadas rhyolite domes located in the eastern part of the Trans Mexican Volcanic Belt offer a unique opportunity for studying debris avalanche deposits at major monogenetic silicic domes. At least 8 individual debris avalanche deposits were identified and classified in basically two different types. First generation deposits are older and originated from 60-90 degree sector collapses. They are **heterolithologic** in composition and include blocks of such diverse lithologies as limestone, lacustrine sediments, juvenile obsidian, dismembered surge deposits, etc. They display **hummocky** topography, have H/L ratios of 0.1 and maximum runout distances of 9 km. Second generation deposits are **stratigraphically** below the first deposits and originated from 20-30 degree sector collapses. They cover smaller areas and also have smaller runout distances of 4.5 km with H/L ratios around **0.2**. They are **monolithologic** in composition, consisting of gray microcrystalline rhyolite ($\text{SiO}_2 > 70\%$, biotite, plagioclase and almandine in a glassy matrix), and are less coarse than first generation deposits. In addition, they form elongated tongues with flat surfaces and have steep terminal scarps. Field and laboratory studies indicate that the domes were formed during a relatively short time span. Integral observations at Las Derrumbadas and other rhyolite structures in the area allowed the recognition of the origin of the differences of both types of avalanche deposits. The **heterolithologic** first generation deposits were formed at an earlier evolutionary stage when the domes were still carrying a carapace of glassy obsidian and rocks from the local basement such as Cretaceous limestone and lacustrine sediments. The **monolithologic** second generation avalanche deposits were formed later when only the microcrystalline juvenile cores of the domes were still exposed. At present, fumarolic activity is further affecting the stability of the slopes and second generation debris avalanche deposits might occur again in the future.